Consumer Inequality Aversion and Risk Preferences in Community Supported Agriculture

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Abstract

In community-supported agriculture (CSA), consumers face a tradeoff between (i.) the desire to support a CSA farmer and obtain environmentally-friendly goods and (ii.) the risk associated with a long-term commitment. We elicit inequality aversion and risk preferences of a sample of 162 French CSA consumers using incentivized field experiments. We find that CSA consumers are concerned about payoff inequalities. While we obtain evidence of advantageous inequality aversion toward CSA farmers, we also find disadvantageous inequality seeking. We find that CSA consumers are risk averse and loss averse and distort probabilities. We also observe that inequality and risk preferences in the loss domain might complement each other to strengthen consumers' support for CSA farmers.

Keywords: Inequality aversion preferences, Risk aversion, Field experiment, Community Supported Agriculture

JEL Classification: C93, D63, D81, Q18

1. Introduction

In recent decades, collective awareness of the importance of environmental issues has increased considerably. Short food supply chains, along with alternative production methods, have been proposed as a response to environmental issues and have resulted in a growing demand for locally produced food. In 2016, an average of 15% of European farms sold more than half of their produce directly to

consumers.[1] Local food supply chains comprise diverse outlets, such as on-farm stores, farmers' markets, roadside stands and community-supported agriculture (CSA).

Basically, in a CSA, a group of consumers, called shareholders, contracts with a local farmer before production takes place to receive a weekly share of products during the growing season. A distinct feature of CSAs is risk-sharing; consumers face a tradeoff between (i.) the desire to support the CSA farmer and consume environmentally-friendly products and (ii.) the risk associated with the variation in low crop output[2] and a long-term purchasing commitment. CSAs are increasingly operating in European countries and in other parts of the world.[3] In the US, the number of CSAs increased from 3,637 in 2009 to between 6,000 and 6,500 in 2015, and CSAs accounted for $226 million (or 7%) of $3 billion of direct-to-consumer farm sales.[4] According to the international CSA network, 2,776 CSAs operated in Europe in 2015, producing food for almost 500,000 consumers (see Volz et al., 2016). These CSAs have mostly been implemented in France. The first CSA was established in France in 2001, and the number of CSAs reached approximately 2,000 in 2016, serving almost 320,000 consumers and 3,500 farms.

The aim of our study is to elicit CSA consumers' preferences regarding the distinct features of CSAs, i.e., support for farmers (or other-regarding preferences) and risk-sharing, through incentivized field experiments.

The use of economic experiments allows us to elicit preferences from carefully-designed choice situations in which CSA consumers were paid according to their

[1] European Parliament Policy Brief, Short food supply chains and local food systems in the EU, http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586650/EPRS-BRI(2016)586650-EN.pdf. See Grebitus et al. (2017) for a recent overview.

[2] Variations in crop output may stem from variability in the weather, damage from pests or unexpected changes in the farmer's personal situation.

[3] See, for example, http://urgenci.net and http://www.localharvest.org/csa/.

[4] See Direct Farm Sales of Food. Results of the 2015 Local Food Marketing Practices Survey, December 2016 and https://thecalloftheland.wordpress.com/2012/01/09/unraveling-the-csa-number-conundrum/.

choices.[5] First, to formalize the notion of other-regarding preferences, we refer to the well-known inequality aversion model of Fehr and Schmidt (1999), which argues that individuals express aversion toward both advantageous (i.e., "I have more money than another") and disadvantageous ("I have less money than another") inequalities in a payoff distribution. We measure these preferences thanks to the design introduced by Briggeman and Lusk (2011). Second, we elicit the risk preferences of CSA consumers using a cumulative prospect theory (CPT) framework (Tversky and Kahneman, 1992). Because CSAs might involve too much produce as well as too little (Galt et al., 2019), we investigate risk preferences both in the gain and in the loss domain using the method developed by Tanaka et al. (2010).

The existing literature has shown that supporting farmers is an important motivation for food consumers. For example, using an incentivized economic experiment, Briggeman and Lusk (2011) find that approximately 15% of consumers' willingness to pay a premium for organic foods is due to altruism and inequality aversion. In the same spirit, using a stated preference survey, Chang and Lusk (2009) elicit the preferences of consumers for several loaves of bread that vary in the distribution of profits over several agents in the food supply chain and find evidence of altruism and inequality aversion. Finally, using an incentivized economic experiment, Toler et al. (2009) report evidence of a higher willingness to pay for payoff distributions that favor farmers, especially the local farmer.

These results echo those found in the existing literature about CSAs, which is based mainly on stated-preference surveys and contract price analyses. For example, Cooley and Lass (1998), collecting answers from CSA members in Amherst, Massachusetts (US), find that the main motivations for consumers are product

[5] In the typology of Harrison and List (2004), our experiment is an artefactual field experiment, as it is "the same as a conventional lab experiment but with a non-standard subject pool".

quality, support for local farming, environmental and food safety concerns and community services (i.e., food donations). Brown and Miller (2008) add social and club benefits to the motivations mentioned above. Bougherara et al. (2009) compare CSA and non-CSA members in Dijon (France) and find that the more people are concerned with social considerations (supporting local farming, personal relationships with the farmers and other consumers), the more likely they are to supply using long-term contracting. Finally, Peterson et al. (2015) analyze the determinants of consumers' choice of outlet for local food supply. Using responses to a stated choice survey of US and French consumers, they find consumers favor CSAs to support local farmers, to control the origin of their food (US only) and respect the environment (French only).

In addition, some works have highlighted the existence of a risk premium and concern about uncertainty over the share value, suggesting that CSA consumers are risk averse. For instance, Cooley and Lass (1998) find that one of the main stated disadvantages of CSAs is uncertainty over the CSA share's monetary value. In their contract price analysis, Sproul et al. (2015) find that the price per delivery in a weight share contract, in which consumers receive fixed quantities, is 38% higher on average than in a yield share contract, in which consumers receive a percentage of the farm's production. In contrast to the former contract type, the latter contract type involves a risk transfer from the producer to the consumer, which translates into a decrease in the price per delivery.

Despite these interesting contributions to understanding CSA consumers, none of them structurally elicited consumers' preference parameters. We plan to fill this gap by structurally eliciting one type of other-regarding preferences – inequality aversion – and risk preferences in the gain and loss domain. To this end, we designed two incentivized field experiments.

Although previous works have demonstrated that other-regarding preferences are highly context-dependent, most experiments have been conducted on stan-

dard subject pools (i.e., students). Our study also aims to contribute to the smaller academic literature on inequality aversion elicitation using non-standard subject pools (Bellemare et al., 2008, for example, outside agriculture). In the agricultural domain, there are few studies on consumers (Briggeman and Lusk, 2011; Chang and Lusk, 2009; Toler et al., 2009) and none on CSA consumers. There is also a large body of experimental economics results on risk preference elicitation showing heterogeneity (Harrison and Rutström, 2008, for an excellent review of the methods and main results). The samples considered thus far are standard subjects (i.e., students) but also representative samples of the general population (Harrison et al., 2007, for example) and farmers (Iyer et al., 2019, for a review). We will contribute to the experimental elicitation of the risk preferences of consumers.

From a sample of 162 French CSA shareholders, we find evidence of inequality aversion. Specifically, we find that CSA consumers are averse to advantageous inequality toward both CSA and non-CSA farmers. However, we also obtain evidence of disadvantageous inequality seeking toward the CSA farmer, a result that has seldom been found in the literature. In line with CPT, CSA consumers exhibit risk and loss aversion and distort probabilities. Finally, we find different relationships between risk and inequality aversion preferences depending on whether inequality aversion preferences involve CSA or non-CSA farmers. An especially interesting result is that subjects who strongly care about inequality toward CSAs are less averse to losses than other subjects.

The article is organized as follows. In section 2, we present the experimental methodology. The results are reported in section 3. Section 4 discusses the findings and concludes.

2. Procedure and experimental designs

First, we detail the general experimental procedure. Next, we present the questionnaire about consumption habits, followed by the two incentivized field experiments.

2.1. Experimental procedure

The experiments were conducted in two waves (June-August 2012; June-July 2013) in the metropolitan area of Rennes, France. We contacted the CSAs by telephone to collect general information and organize interviews. Once the CSA managers had agreed to participate in the study, we visited the CSA delivery location on a scheduled delivery day.[6] We explained that we were conducting a study to better understand the design of CSA programs and invited everyone who was interested and had time to do so to answer a questionnaire. Appointments were sometimes made to complete the questionnaire in a different delivery period. Overall, 162 subjects from 16 different CSAs completed the questionnaire. All had committed to a CSA for vegetables. Before beginning, the subjects signed a consent form and were given instructions regarding how to complete the questionnaire. The instructions indicated that (i.) all responses were confidential (i.e., the experimenter could not associate the participant's identity with his answers); (ii.) the participants were to complete several sets of decision tasks; and (iii.) once they had completed all tasks, one of the two incentivized tasks, which were presented to the subjects in a randomized order, would be randomly selected for payment. The experiment began with a questionnaire about typical food purchases, followed by 2 experimental tasks and a questionnaire about sociodemographic characteristics.[7] Given the duration of the survey (an average of 40 min-

[6]Note that no CSA refused to participate in this study, and the aim of the study was never revealed until the end of the study.

[7]The experiment involved a third non-incentivized task that is not part of this paper and is not presented here. The questionnaire is reported in Appendix.

utes, which is relatively long considering that the participants had planned only to pick up their CSA baskets), face-to-face implementation was favored.[8] The payoffs, including a € 10 show-up fee, varied from € 8.90 to € 19.[9,10]

2.2. Questionnaire about consumption habits

The subjects began the experiment with a questionnaire about consumption habits. The questions were similar to those of Peterson et al. (2015). There were some general questions about their purchasing activities, such as the extent of their knowledge and use of several food supply channels. The subjects also had to rate on a 5-point Likert scale some criteria that might influence their purchasing activities, such as taste, appearance, production and marketing location and environmental impact. There were also questions about related activities, for example, their consumption of fresh products, their knowledge of products' origin, their support for local farmers, etc. The questionnaire ended with questions about their current CSA contract, such as duration, basket size and weight, price, frequency of losses and how long they had been CSA members.

[8] Because only volunteers took part in this study, it is not possible to determine a response rate.

[9] A standard procedure in experimental economics in both the lab and the field consists in offering participants a show-up fee to reward them for their participation (see, for example, Fréchette and Schotter, 2015; Arechar et al., 2018). This fee is a guaranteed payoff that is added to the earnings that subjects receive from their performance in the experiment. The use of a show-up fee is largely grounded on mental accounting (Thaler, 1999), where subjects implicitly assign the show-up fee to a budget separable from the earnings in the experiment. If we assume mental accounting, using a show-up fee should not bias giving.

[10] For the risk experiment, the lottery payoffs ranged from € -2.10 to € 170 (excluding the show-up fee). For the distribution experiment, the payoffs ranged from € 0 to € 4 (excluding the show-up fee). The procedure for payments was first to randomly draw one of the field experiments. The participants had a 50% chance of being paid according to the risk experiment and a 50% chance of being paid according to the distribution experiment. If the risk experiment was drawn, each binary lottery had a 1/35 chance of being drawn. Once the lottery was selected, it was played for payment. If the distribution experiment was drawn, 2 of the 13 options were randomly selected. The selected options were shown to the subjects, who were paid according to the highest-ranked option among the two selected options.

2.3. Experiment 1. Eliciting inequality aversion preferences

Traditionally, economic models have assumed that individuals are interested only in their own material well-being. However, there is now extensive evidence, mainly from behavioral economics, that people exhibit other-regarding preferences such as altruism, reciprocity or inequality aversion (see, for instance, Cooper and Kagel, 2015 for a recent selective survey). We focus on inequality aversion preferences, in which their intensity may depend on the identity of the "other". To investigate this issue, we conducted an incentivized field experiment in the spirit of Briggeman and Lusk (2011). We elicited subjects' preferences regarding the distribution of the payoffs received by the subject himself and two other members of the agricultural supply chain: a CSA farmer and a non-CSA farmer. When describing the two farmers, it was made clear that (i.) they were unknown to the subjects; (ii.) both used identical organic production processes; and (iii.) they differed only in the channel through which their products were sold, i.e., the CSA farmers were described as supplying only CSAs. By considering these two types of farmers, we controlled for production practices, and the subjects' decisions reflected only the importance of the supply channel.

In this experiment, each subject was asked to rank 13 options that differed in terms of the amount of money allocated to the subject, to a CSA farmer, and to a non-CSA farmer (see Table 1). The allocation levels were selected by generating a full factorial design of the potential payouts. Given that there were 5 potential payouts (i.e., 0, 1, 2, 3, 4) and 3 recipients (2 farmers and the respondent), there were $5^3 = 125$ possible payouts, which was too many to ask the subjects to rank. Thirteen options were therefore selected from this full factorial design by maximizing a D-efficiency criterion under the constraint that the sum of the payouts for each option was equal to €8. We added this constraint to ensure that the subjects revealed how they would like to share the "cake" instead of whether they wanted to increase its size. This strategy enabled us to rule out behavior that

Table 1: Experimental decision task for the elicitation of inequality aversion preferences

Options	You	CSA farmer	Non-CSA farmer
1	4	2	2
2	0	4	4
3	2	2	4
4	3	4	1
5	2	4	2
6	4	0	4
7	3	1	4
8	2	3	3
9	4	3	1
10	1	4	3
11	3	3	2
12	4	1	3
13	4	4	0

Note: Payoffs are in euros.

maximized the total payoff as an explanation for the chosen rankings.[11]

To provide strong incentives to subjects to rank all 13 options according to their preferences, we implement the following incentive mechanism. Once subjects had made their complete rankings, 2 of the 13 options were randomly selected. From these selected options, we examined their respective rankings, and the subjects were paid according to the distribution of the allocations described by the highest-ranked option among the 2 randomly selected options. The subjects received the payoff that had accrued to them, and the payoffs dedicated to farmers were sent to them.[12] Farmers who were unknown to the subjects were randomly selected from a list of CSA farmers (provided by regional CSA promoters) and non-CSA farmers (provided by the local Chamber of Agriculture, an assembly of farmer representatives) in the area surrounding Rennes, France. This incentive mechanism is common knowledge. Finally, the order of the 13 options

[11] Such behavior is called "efficiency concerns" in the literature on other-regarding preferences (see Engelmann and Strobel, 2004). Here, efficiency is understood simply as the sum of the payoffs rather than efficiency in the sense of Pareto efficiency.

[12] For illustration purposes, assume for a subject that options 4 and 10 have been randomly selected and that this subject has ranked option 4 in position 9 and option 10 in position 2. It follows that this subject received the payoff allocated to him under option 10, that is, € 1.

was randomized across subjects to avoid any systematic order bias.

The use of the distributional experiment of Briggeman and Lusk (2011) has several advantages. First, as argued by Briggeman and Lusk (2011), ranking multiple options from best to worst provides more information than discrete decisions.[13] Second, from the observed rankings, it is possible to estimate empirical models to isolate inequality aversion preferences components of subjects. Finally, this type of framework has proven to be powerful in investigating the impact of fairness preferences in food systems (see Chang and Lusk, 2009, for example). In the present study, the rankings permitted us to examine whether, in a given situation, the subjects tended to favor farmers over themselves and whether the type of farmer affected their decision. Given our subject pool, it was very likely that the subjects would be more concerned with the payoff of CSA farmers than with the payoff of non-CSA farmers.[14]

2.4. Experiment 2. Eliciting risk preferences

When consumers commit to a CSA, their support takes the form of production risk-sharing, as they pay for the harvest before production; thus, consumers protect farmers from financial risk. At the same time, consumers are assumed to receive weekly baskets of available products of which the size and the content vary with production risk. Risk may be due to variations in meteorological conditions or to unexpected events, such as management errors. For these reasons, CSA baskets can involve more or less produce than expected (see Galt et al., 2019). Given this context, it was necessary to elicit attitudes toward risk using a

[13] For example, Blanco et al. (2011) elicited inequality aversion by means of a modified dictator game and an ultimatum game in which they provided respondents with a list of binary choices.

[14] Note that experimenter demand effects, where experimental subjects change behavior due to cues about what constitutes appropriate behavior (see Zizzo, 2010), could have been a concern if we had wanted to investigate the difference in payouts allocated to CSA and non-CSA farmers. However, in the present study, we are interested mainly in the sensitivity to differences in payoffs between the subject and each type of unknown farmer.

design that allowed for both gains and losses. The method developed by Tanaka et al. (2010) is well suited for this purpose.[15] Following this method, the subjects were presented with three series of paired lotteries in which outcomes and probabilities varied, as shown in Table 2. For each of the three series, the probabilities remained constant across the decision tasks. Each consisted of a choice between two binary lotteries, left (L) and right (R). In the first two series, only gains were possible, which permitted us to estimate a parameter for risk preferences. In series 1, for instance, a risk-neutral subject would choose lottery L for the first six decisions listed in Table 2 because the expected value of lottery L exceeded the expected value of lottery R for these choices. As the subject moved down each row for a given series in Table 2, the expected value of lottery R exceeded, to an increasingly greater degree, the expected value of lottery L. In the third lottery, both gains and losses were introduced as possible outcomes, while the probabilities remained identical both between and across choices. The choices that subjects made in the third lottery allowed us to estimate a parameter measuring their degree of loss aversion.

[15]For practical reasons, we focus on eliciting financial risk preferences rather than providing less or more food products. Note that the literature using non-incentivized surveys has shown that risk preferences are domain-specific (finance, sports, health, etc.); see Dohmen et al. (2011). This method could have been an alternative to our protocol if we had chosen a non-incentivized task. The interested reader may also refer to Harrison and Rutström (2008) for a review of economic experimental designs to elicit risk preferences.

Table 2: Three Series of Pairwise Lottery Choices

Lottery Left (L)			Lottery Right (R)			EP Difference (EP(L)-EP(R))
Series 1						
Prob 0.3	**Prob 0.7**	**EP**	**Prob 0.1**	**Prob 0.9**	**EP**	
4	1	1.9	6.8	0.5	1.13	0.77
4	1	1.9	7.5	0.5	1.20	0.70
4	1	1.9	8.3	0.5	1.28	0.62
4	1	1.9	9.3	0.5	1.38	0.52
4	1	1.9	10.6	0.5	1.51	0.39
4	1	1.9	12.5	0.5	1.70	0.20
4	1	1.9	15	0.5	1.95	-0.05
4	1	1.9	18.5	0.5	2.30	-0.40
4	1	1.9	22	0.5	2.65	-0.75
4	1	1.9	30	0.5	3.45	-1.55
4	1	1.9	40	0.5	4.45	-2.55
4	1	1.9	60	0.5	6.45	-4.55
4	1	1.9	100	0.5	10.45	-8.55
4	1	1.9	170	0.5	17.45	-15.55
Series 2						
Prob 0.9	**Prob 0.1**	**EP**	**Prob 0.7**	**Prob 0.3**	**EP**	
4	3	3.9	5.4	0.5	3.93	-0.03
4	3	3.9	5.6	0.5	4.07	-0.17
4	3	3.9	5.8	0.5	4.21	-0.31
4	3	3.9	6	0.5	4.35	-0.45
4	3	3.9	6.2	0.5	4.49	-0.59
4	3	3.9	6.5	0.5	4.70	-0.80
4	3	3.9	6.8	0.5	4.91	-1.01
4	3	3.9	7.2	0.5	5.19	-1.29
4	3	3.9	7.7	0.5	5.54	-1.64
4	3	3.9	8.3	0.5	5.96	-2.06
4	3	3.9	9	0.5	6.45	-2.55
4	3	3.9	10	0.5	7.15	-3.25
4	3	3.9	11	0.5	7.85	-3.95
4	3	3.9	13	0.5	9.25	-5.35
Series 3						
Prob 0.5	**Prob 0.5**	**EP**	**Prob 0.5**	**Prob 0.5**	**EP**	
2.5	-0.4	1.05	3	-2.1	0.45	0.60
0.4	-0.4	0.00	3	-2.1	0.45	-0.45
0.1	-0.4	-0.15	3	-2.1	0.45	-0.60
0.1	-0.8	-0.15	3	-1.6	0.70	-0.85
0.1	-0.8	-0.35	3	-1.6	0.70	-1.05
0.1	-0.8	-0.35	3	-1.4	0.80	-1.15
0.1	-0.8	-0.35	3	-1.1	0.95	-1.30

Note: Payoffs are in euros. EP stands for expected payoff. Expected payoffs and differences in expected payoffs were not shown to subjects.

3. Results

We present our sample characteristics followed by the results obtained in each experiment, for which we first provide descriptive statistics and then conduct parametric analysis. Finally, we examine the relationship between inequality aversion and risk preferences.

3.1. Sample characteristics

The responses to our sociodemographic questionnaire are reported in Table 3. Age was collected as a quantitative variable. Among all participants, the average age was 43. In Table 3, we use a categorical variable for age to allow comparison with the local population. The distribution across the age groups suggests that both the youngest and oldest segments of the population were undersampled relative to the local population, with 78.89% of subjects between the ages of 30 and 59. Sixty-five percent of our sample was female; therefore, women were overrepresented compared to the local population. However, this observation is usual in studies on food consumers; see, for example, the study of Peterson et al. (2015), in which women represented 69% of the French sample. Our sample was also biased toward highly educated people: 48.15% of the subjects reported having more than an undergraduate degree (i.e., a bachelor's degree). This observation translated into the actual occupations of the participants: 45.68% had a highly intellectual occupation, compared to 14.06% of the local population. Finally, the median income reported was between € 3,100 and € 3,999, which was in line with the median local income of € 3,359 for a 3-person household.[16]

The use of data from our sample may introduce selection bias into the analysis in the sense that our subjects' characteristics differed from those of the local population, and the expressed preferences for different food outlets may not be generalizable across the full population. However, the aim of our study is to focus on CSA consumers, and the characteristics of our sample are similar to those of CSA consumers. According to a 2013 study on participatory practices in France, French CSA consumers are mainly women (55%), are between 25 and 55 years old, have more than an undergraduate degree, i.e., a bachelor's degree (54%), and

[16]The average size of our sample was a 3-person household; see `https://www.salairemoyen.com/department-35-Ille_et_Vilaine.html` for local data (data source: French National Institute of Statistics and Economic Studies, INSEE; French Ministry of Finance).

have highly intellectual occupations (31%); 43% have a monthly income higher than € 3,000.[17]

Table 3: Sociodemographic characteristics

		Sample frequency	Local population (NUTS3)[a]
Age			
	15-29 yrs	9.26	19.7
	30-44 yrs	46.91	19.8
	45-59 yrs	31.98	19
	60-74 yrs	12.35	13.8
Gender			
	Male	34.57	48.4
	Female	65.43	51.6
Household monthly income			
	€ <1,100	4.94	NA
	€ 1,100-1,899	10.49	NA
	€ 1,900-2,299	9.26	NA
	€ 2,300-3,099	19.75	NA
	€ 3,100-3,999	27.16	NA
	€ 4,000-6,499	24.69	NA
	€ >6,500	3.70	NA
Actual occupation			
	Self-employed occupation in agriculture	0	1.73
	Small employer and self-employed occupation (agriculture excluded)	2.47	4.48
	Higher grade professional administration and managerial occupation	45.68	14.06
	Intermediate occupation	32.1	51.07
	Retired	11.11	7.3
	Students	2.47	12.9
	Unemployed	2.47	8.1
Education level[b]			
	Middle or junior high school, 8^{th} grade	0.62	26.3
	Certificate of vocational competency (CAP, BEP)	4.94	24.7
	Baccalaureate	6.79	17.5
	University		31.6
	+1 or 2 yrs	19.75	NA
	Bachelor's (+ 3 yrs)	19.75	NA
	Master's (+ 4 yrs)	12.35	NA
	Higher than master's (+ 5 yrs)	35.80	NA

Note: NA means "not available." [a]: The Nomenclature of Territorial Units for Statistics (NUTS) classification is a hierarchical system for dividing the economic territory of the EU (`https://ec.europa.eu/eurostat/web/nuts/background`). In France, NUTS3 is the "Département". Data source: INSEE, Mesurer pour comprendre. Evolution et structure de la population d'Ille et Vilaine en 2015.[b]:). For the educational level, once students receive their baccalaureate at the end of secondary school, they can enter the post-secondary education system (e.g., university). When our subject pool was in the post-secondary education system, they could obtain a diploma following a one-year track, a two-year track (University +1 or 2 years), a 3-year track (designated as a bachelor's degree), a 4-year track (designated as a master's degree) or more than 4 years in the post-secondary education system (designated as higher than a master's degree).

Regarding food purchase habits, the subjects reported that CSAs were not the sole source of their food supply; they also visited local markets and organic food stores every two weeks, shopped at specialty stores on average twice a week and, with a lower frequency, visited larger retail stores (on average once a week). These results contrast with the food purchase practices of the general population. An IPSOS study conducted in 2014 in France showed that large retail stores rep-

[17]Les français et les pratiques collaboratives, 2013, Ipsos Public Affairs; `https://ademe.typepad.fr/files/ademe-pratiques-collaboratives-08.02.13.pdf`.

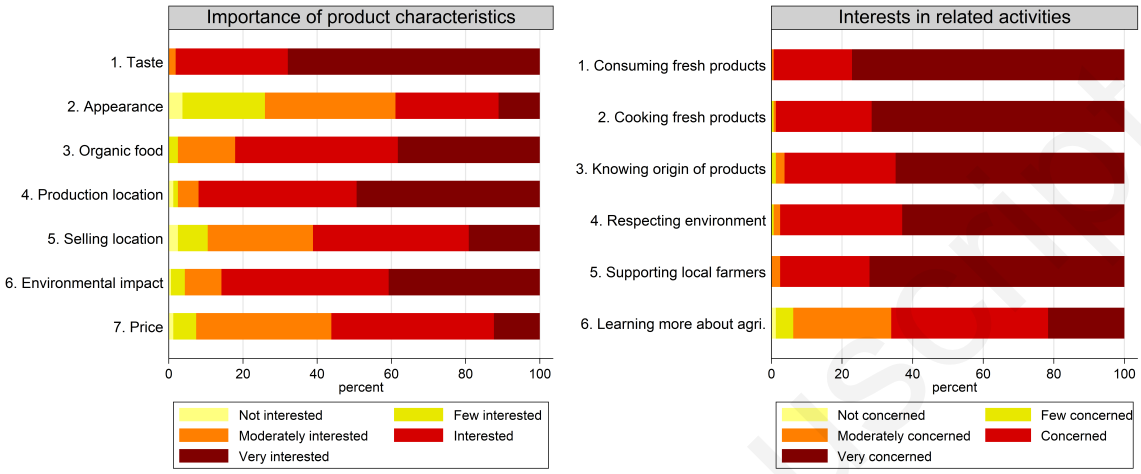
resent the main source of food supply for 68% of the interviewed population.[18] This finding suggests that our sample was more interested in fresh and specialized products than industrially produced food products. These results were confirmed by questionnaire responses regarding the importance of certain criteria when buying fresh vegetables and the subjects' interest in related activities. The responses, expressed on a 5-point Likert scale, are reported in Fig. 1.

We observed that the subjects, in terms of buying fresh vegetables, valued the taste of the products (see the left panel of Fig. 1) and cared about the freshness and environmental footprint of the food that they purchased (see the right panel of Fig. 1). This attitude translated into high average ratings (between 4.59 and 4.76) for these characteristics. As the participants were CSA consumers, we also noted that they were homogeneous in highly rating organic food and the production location (average rate between 4.18 and 4.37; s.d. between 0.75 and 0.78). Conversely, interest in the appearance of products, the selling location and price was relatively lower and more heterogeneous (average rates between 3.2 and 3.67; s.d. between 0.83 and 1.03). These ratings corroborated the idea that CSA consumers seek healthy, authentic and tasty food that justifies their willingness to pay a higher price or to not consider the price as a key criterion when buying fresh vegetables. The subjects' answers also confirmed that they highly value the origin of the product and the support of local farmers (all average ratings higher than 4.59; s.d. lower than 0.6). These interests were perfectly in line with their decision to join a CSA. For the purpose of the present study, the high level of concern for local farmer support was of particular interest because it pointed to other-regarding preferences and the willingness to share risk. The subjects, however, expressed relatively lower and heterogeneous interest in learning more

[18] Ipsos Bienvenue à La Ferme, 2014, "Consommer local": ce que veulent les Français, https://www.ipsos.com/fr-fr/consommer-local-ce-que-veulent-les-francais.

about agriculture (average rate 3.8; s.d. 0.87).

Figure 1: Sample opinions about..



Finally, we also collected information about the subjects' current contracts. Of the subjects, 69.57% had 6-month contracts, while only 4.97% of the subjects reported having contracts lasting less than 6 months; among these subjects, 37.5% had joined the CSA for less than 5 months. Finally, 25.46% of the contracts were annual contracts (i.e., with a duration of 10 or 12 months). The prices were relatively heterogeneous, ranging between € 6 and € 17, with the most common being € 10 per basket (40.37%). This observation should be considered with some caution because, when we interviewed them, some subjects did not recall exactly how much they had paid for their basket at the beginning of the season. In addition, the variations in price observed may be related to variations in basket size. Finally, we collected information on the occurrence of losses through an open question: "Are there any losses from time to time between June and March?" Only 37% of the subjects had observed losses, and 60% of those subjects reported that the losses were small and very rare. This declaration may appear surprising, given that 52.47% of our sample had been members of the CSA for more than 2 years and received a weekly basket. One can assume that for sub-

jects who had been members of a CSA for a long time and received a basket each week, the probability that they faced a production loss may be relatively high.[19]

3.2. Results for inequality aversion preferences

We turn now to the incentivized distribution experiment. We first report some descriptive results before detailing the parametric analysis conducted and the obtained results.

3.2.1. Descriptive results

In the incentivized distribution experiment, each subject was asked to rank 13 options for a distribution of payouts between himself, a CSA farmer and a non-CSA farmer. Table 4 displays the frequency with which each option was chosen for the best and worst rankings.

Regardless of the best or worst rankings, there seemed to be options that caught the attention of the subjects; 2 or 3 of the 13 available options represented more than 50% of the subjects' choices. However, some heterogeneity in the motivations behind these rankings can be observed. For example, option 2 was ranked first by 30.86% of the subjects, but it was also ranked last by 15.44% of the subjects. Similarly, option 13 was ranked first by 14.20% of the subjects and ranked in the penultimate position by 26.54% of the subjects.

In addition, focusing on the highest-ranked options, we observe that option 2 was ranked first by 30.86% of the subjects, and option 10 was ranked second by 34.57% of the subjects. These two options shared the particularity of favoring the two farmers over the subject himself. In addition, 25.93% of the subjects ranked option 2 first and option 10 second. Even if both the CSA and non-CSA farmers were unknown to the subjects, it seems that the subjects did not experience disu-

[19] We cannot further explain this observation since, in the CSA contracts of our subject pool, there is no information about how CSAs proceed in case of crop failure, such as if the CSA farmer supplies outside the CSAs.

tility from having less than the farmers, especially the CSA farmer. Regarding the lowest-ranked options, we note that these options were mainly those for which one of the three recipients received nothing (options 6, 2 and to a lesser extent 13), suggesting that the subjects either preferred securing a minimal payoff for each recipient or that they were generally sympathetic towards farmers.[20]

Table 4: Ranking of options in the distribution experiment

Option	Payoffs	Ranking			
	(x, y, z)	1st position	2nd position	Penultimate position	Last position
1	4,2,2	4.32	4.32	0.62	1.85
2	0,4,4	**30.86**	5.55	7.40	15.44
3	2,2,4	0.00	0.62	3.09	1.85
4	3,4,1	2.47	8.64	0.00	0.62
5	2,4,2	12.35	11.73	1.85	0.00
6	4,0,4	0.00	0.62	16.67	**67.90**
7	3,1,4	0.00	0.62	14.20	1.23
8	2,3,3	12.35	14.81	0.00	0.00
9	4,3,1	1.85	6.79	3.09	0.62
10	1,4,3	8.64	**34.57**	7.40	0.00
11	3,3,2	12.96	9.26	0.00	0.00
12	4,1,3	0.00	0.62	19.14	1.23
13	4,4,0	14.20	1.85	**26.54**	9.26

Note: x, y, z denote the payout of the subject, the CSA farmer and the non-CSA farmer, respectively. Grey cells indicate the options, in each ranking, chosen by the largest share (in bold) and the second-largest share of subjects.

3.2.2. Parametric analysis

To confirm these observations, we provide a more in-depth analysis by detailing the theoretical model, our empirical strategy and, finally, the results obtained.

Conceptual models

We assume that the utility of a subject i can be modeled using random utility models. Following the literature on other-regarding preferences (see Loewenstein et al., 1989, for example), the social utility function specifies the level of satisfaction as a function of the outcomes for the self and others. In this respect, we consider a functional form in which, in addition to his own payoff, the subject cares about the difference in payoffs between himself and each other recipient. This formulation echoes the well-known utility function introduced by Fehr and Schmidt (1999) that allows us to distinguish positive from negative payoff dif-

[20] We thank an anonymous reviewer for this latter suggestion.

ferences. In our context, the deterministic component of the Fehr-Schmidt utility function for subject i choosing an option $j \in \{1, 2, .., J\}$ with $J = 13$ is written as:

$$V_{ij} = x_j + \alpha_1 \max\{0; y_j - x_j\} + \alpha_2 \max\{0; z_j - x_j\} \\ + \beta_1 \max\{0; x_j - y_j\} + \beta_2 \max\{0; x_j - z_j\} \quad (1)$$

with the first term, x_j corresponds to subject i's payoff under option j. The next two terms adjust for "disadvantageous inequality", that is, inequality for subject i resulting from receiving a lower payoff than that of the CSA farmer, y_j, and the non-CSA farmer, z_j, under option j. Finally, the last two terms adjust for "advantageous inequality", that is, inequality for subject i resulting from receiving a higher payoff than that of the CSA farmer, y_j, and the non-CSA farmer, z_j, under option j. Following Fehr and Schmidt (1999)'s model, the subjects express inequality aversion (that is, $\alpha_k < 0$, $\beta_k < 0$, $k = \{1; 2\}$ in eq. 1).

As our experimental design replicates that of Briggeman and Lusk (2011), we first focus on a constrained model, assuming that subjects dislike, with the same sensitivity, payoff differences in either direction. This means that we consider the same slope of payoff differences, that is, $\alpha_k = \beta_k$, $k = \{1; 2\}$. The estimation of this model allows us to estimate a model very close to that estimated by Briggeman and Lusk (2011) and, in a further step, to test the constraint imposed by Briggeman and Lusk (2011), i.e., $\alpha_k = \beta_k$, $k = \{1; 2\}$.[21]

Empirical methodology

To this end, the rankings that subjects applied to particular options were estimated using a generalization of conditional logit models called the rank-ordered logit model (ROL), as introduced by Beggs et al. (1981). To the best of our knowl-

[21] Note that because the sum of the payoffs is constant across the 13 options (i.e., $x_j + y_j + z_j = 8, \forall j$), the CSA and non-CSA payoffs cannot be included in eq.1. In this way, the social utility function refers only to the subject's payoff and the differences in payoffs between himself and others.

edge, no study thus far has estimated the inequality aversion parameters of Fehr and Schmidt (1999) using ROL models.

The utility U_{ij} that subject i derives from option j is composed of a deterministic component,V_{ij}, determined by observed characteristics (see eq.1) and a stochastic error term ϵ_{ij} that is assumed to be independent and identically distributed, following type I extreme-value distribution. Under this assumption, for a particular subject i, we write his ranking of the J choices as $r_i = r_{i1}, r_{i2}, \cdots, r_{iJ}$ so that the probability of his observed ranking is defined as shown in eq.2:

$$Pr(r_i) = Pr(U_{ir_{i1}} > U_{ir_{i2}} > \cdots > U_{ir_{iJ}}) \tag{2}$$

Considering $U_{ij} = V_{ij} + \epsilon_{ij}$ and the assumption made on ϵ_{ij}, eq. 2 can be written as:

$$Pr(r_i) = \prod_{j=1}^{J-1} \frac{e^{V_{ir_{ij}}}}{\sum_{l=j}^{J} e^{V_{ir_{il}}}} \tag{3}$$

The estimation of eq.3 provides the mean value for each parameter. To account for the difference between subjects depending on their sociodemographic characteristics, we also conduct estimations in which each parameter interacts with the sociodemographic characteristics of the subjects.[22]

Results

Columns 1 and 2 of Table 5 present the results for the constrained model (i.e., $\alpha_k = \beta_k$). We note that, regardless of the payoff differences, the negative coefficients indicate that options with a high difference were less preferred, which demonstrates inequality aversion in our sample. In addition, inequality aversion appears to be stronger toward CSA farmers than toward non-CSA farmers (odds ratios of 59% and 72%, respectively[23]).

[22]Note that all results reported in this section are robust if we cluster at the CSA level.

[23]The odds ratios measure the percentage change in the odds of ranking an option ahead vs. behind for a one-unit increase in the explanatory variable given the payoff allocated to the subject.

Table 5: Rank-ordered logit results

	Constrained model[a] $\alpha_k = \beta_k$		Unconstrained model $\alpha_k \neq \beta_k$	
	(1)	(2)	(3)	(4)
Disad. ineq. btw CSA farmer and subject (α_1)				
Constant	-0.533***	-0.468***	0.478***	0.299*
	(0.024)	(0.146)	(0.038)	(0.157)
Female		-0.029		0.056
		(0.053)		(0.088)
Age		0.001		0.003
		(0.002)		(0.003)
Income[a]		-0.049		0.036
		(0.050)		(0.077)
Education[a]		-0.055		0.004
		(0.053)		(0.077)
Disad. ineq. btw non-CSA farmer and subject (α_2)				
Constant	-0.323***	-0.542***	-0.088**	0.111
	(0.033)	(0.173)	(0.037)	(0.181)
Female		-0.088		-0.225***
		(0.069)		(0.079)
Age		0.0071**		-0.002
		(0.003)		(0.003)
Income[a]		-0.040		0.042
		(0.067)		(0.073)
Education[a]		-0.022		0.045
		(0.067)		(0.076)
Adv. ineq. btw CSA farmer and subject (β_1)				
Constant	-0.533***	-0.468***	-0.926***	-0.665***
	(0.024)	(0.146)	(0.029)	(0.151)
Female		-0.029		-0.135**
		(0.053)		(0.061)
Age		0.001		0.002
		(0.002)		(0.003)
Income[a]		-0.049		-0.063
		(0.050)		(0.060)
Education[a]		-0.055		-0.113*
		(0.053)		(0.064)
Adv. ineq. btw non-CSA farmer and subject (β_2)				
Constant	-0.323***	-0.542***	-0.643***	-0.721***
	(0.033)	(0.173)	(0.037)	(0.180)
Female		-0.088		-0.191**
		(0.069)		(0.077)
Age		0.0071**		0.006*
		(0.003)		(0.003)
Income[b]		-0.040		-0.041
		(0.067)		(0.072)
Education[b]		-0.022		-0.050
		(0.067)		(0.077)
Goodness of fit				
Number of obs.	2,106	2,106	2,106	2,106
Log likelihood	-4,894.286	-4,883.948	-3,275.961	-3,249.10
Prob>0	0.000	0.0000	0.0000	0.0000
Akaike Information Criterion (AIC)	9,792.5721	9,787.8951	6,559.9219	6,538.1995
Bayesian Information Criterion (BIC)	9,803.8772	9,844.4205	6,582.5321	6,651.2504

Notes: [a] Because in the constrained model $\alpha_k = \beta_k$, we report the same estimate for α_k and β_k. [b] Income is a dummy variable equal to 1 if the reported income is greater than or equal to € 3,099; Education is a dummy variable equal to 1 if the reported educational level is greater than or equal to a master's degree. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Robust standard errors are in parentheses.

When we consider the subjects' characteristics (column 2), we observe that they do not impact inequality aversion (except for older subjects with respect

to non-CSA farmers), while the average impact of inequality aversion remains significant in the ranking process decision.

We now deepen and refine our analysis of inequality aversion by permitting different slopes for disadvantageous and advantageous payoff differences (see eq. 1). The results are reported in columns 3 and 4 of Table 5.

First, information criteria (AIC, BIC) reveal the superior performance of our unconstrained model. The fact that the introduction of separate terms for disadvantageous and advantageous payoff differences leads to such an improvement suggests that there is a discontinuity in the treatment of payoff differences from an equal payoff. Considering disadvantageous inequality first, the subjects exhibited aversion toward inequality between a non-CSA farmer and themselves ($\alpha_2 < 0$) while appearing to seek out the same type of inequality between a CSA-farmer and themselves ($\alpha_1 > 0$). In contrast to the theoretical model of Fehr and Schmidt (1999), which assumes aversion toward disadvantageous inequality, but in line with our descriptive statistics, we find evidence of some disadvantageous inequality seeking preferences toward CSA farmers.[24]

Regarding advantageous inequality, the subjects exhibited disutility from payoff inequality regardless of the type of farmer ($\beta_k < 0, \forall k$). Aversion to advantageous inequality was, however, stronger with respect to a CSA farmer than with respect to a non-CSA farmer (odds ratios of 60.4% and 47.4%, respectively).[25]

Introducing the interaction terms with the sociodemographic characteristics of the subjects in our unconstrained model (column 4) confirms that few indi-

[24]This finding is most certainly related to the fact that our sample was composed exclusively of CSA consumers who were sensitive to the well-being of CSA farmers. Nonetheless, Bellemare et al. (2008) indicate that in some cases, as in high monetary payoffs to share, disadvantageous inequality-seeking behaviors may arise. Yang et al. (2016) also find some evidence of disadvantageous inequality-seeking behaviors that vanish when controlling for efficiency concerns.

[25]Note that the sensitivity toward advantageous inequality was higher than the sensitivity toward disadvantageous inequality for non-CSA farmers (i.e., $|\beta_2| > |\alpha_2|$). This result contradicts the hypothesis of Fehr and Schmidt (1999), but it is in line with the findings of some recent studies (see Blanco et al., 2011; Bonein and Denant-Boèmont, 2015, for instance).

vidual characteristics impact inequality aversion preferences. We note only that women are more averse to advantageous inequality than men, regardless of the type of farmer. This result corroborates the results highlighted by Bellemare et al. (2008), who conduct an experiment on a large representative sample of subjects from the Dutch population and find that individual characteristics have little influence on disadvantageous inequality preferences.

3.3. Results for risk preferences

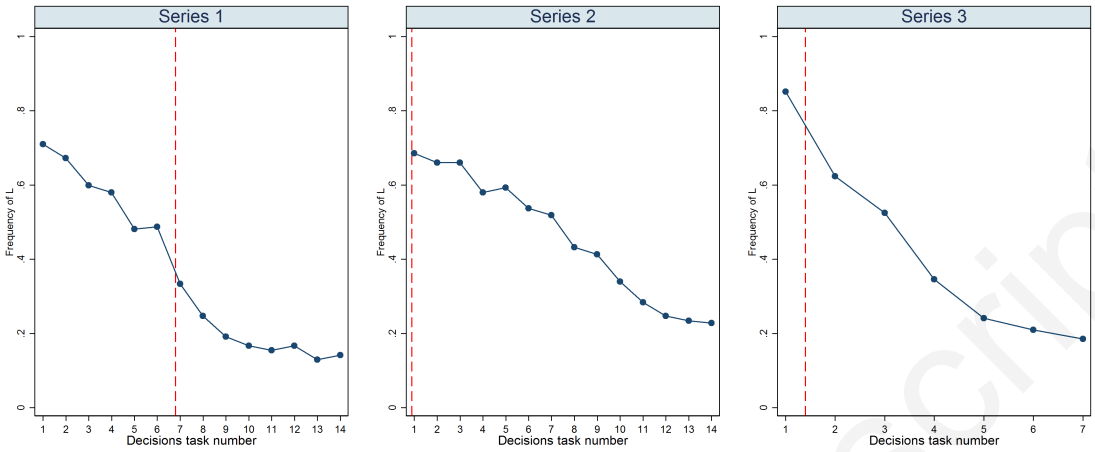
We now consider the risk experiment. We first report some descriptive results before detailing the parametric analysis and the obtained results.

3.3.1. Descriptive results

In the risk experiment, each subject was asked to choose between two incentivized lotteries (see Table 2). Among our sample, 90.74% of subjects behaved consistently; i.e., if they switched from choosing lottery L to choosing lottery R at some point in a given series, they did not switch back. Similar proportions of consistent choices were observed within each series (94.5%, 93.83% and 95.06% in series 1, 2 and 3, respectively). Fig. 2 displays the proportion of choices for lottery L (i.e., safe choice) for each decision task in each series. For the three series, the frequency of L choices lies to the right of the risk- and loss-neutral predictions, showing a tendency toward risk- and loss-averse behavior among our subjects.[26]

[26]Observing theoretically inconsistent subjects who switch back and forth is a common feature of multiple price list methods (see Harrison et al., 2005; Drichoutis and Nayga, 2013). As suggested by Andersen et al. (2006) and Bruner (2011), there are several ways to reduce the impact of this behavior. In our design, we did not impose any restrictions on switching, and we checked its impact *ex-post*. For Fig. 2 and the reported analysis, the full sample of available observations was used. The observations change very little if we eliminate inconsistent subjects, i.e., those who switched from R back to L. The average number of safe choices (i.e., lottery L) decreases slightly if we restrict our attention to consistent subjects, but by less than 0.1.

Figure 2: Predicted and actual proportions of lottery L choices per series



Note: The vertical dashed lines represent the theoretical switching point at which subjects are risk and loss neutral.

3.3.2. *Parametric analysis*

To elicit individual risk preferences in the gain and loss domains, we estimate a structural model assuming CPT (Tversky and Kahneman, 1992) and a Fechner stochastic error.[27] To determine the risk and loss aversion parameters in our sample, we follow the modeling strategy of Harrison and Rutström (2008) and Andersen et al. (2010).

Table 2 shows that subjects faced a series j of lotteries in which a choice had to be made between two lotteries, L and R: $\{p_j^L, y_h^L; (1-p_j^L), y_l^L\}$ and $\{p_j^R, y_h^R; (1-p_j^R), y_l^R\}$. Lottery L (resp. R) offered a high outcome y_h^L (resp. y_h^R) with probability p_j^L (resp. p_j^R) and a low outcome y_l^L (resp. y_l^R) with probability $1-p_j^L$ (resp. $1-p_j^R$). Note that lottery R had a larger variance than lottery L. We model individual utility as described by CPT, according to which "losses loom larger than gains".

[27] We estimate three candidate models: expected utility theory, CPT without noise and CPT with noise. After computing the information criteria, we retain the model using CPT with noise. Note that the Fechner model slightly underestimates risk aversion and slightly overestimates probability distortion.

The value function is written as shown in eq. 4.

$$v(y) = \begin{cases} y^r & \text{if } y \geq 0 \\ -\lambda.\,[(-y)^r] & \text{if } y < 0 \end{cases} \tag{4}$$

where y is the outcome of the lottery, r is the concavity of the utility function, and values of r smaller than 1 yield a concave value function for gains (i.e., risk aversion) and a convex value function for losses (risk seeking). Furthermore, λ, the loss aversion parameter, reflects the relative sensitivity to losses versus gains and is often found to be larger than 1, indicating loss aversion.

We model the decision as a discrete choice model considering a latent variable d^*, as shown by eq. 5).

$$d = \begin{cases} 1 \text{ if } d^* > 0 \\ 0 \text{ if } d^* \leq 0 \end{cases} \tag{5}$$

Under CPT, probabilities are transformed according to the probability weighting function, where γ is a parameter describing the shape of the probability weighting function in eq. 6, where $\gamma < 1$ (resp. $\gamma > 1$) implies overweighting (resp. underweighting) of small probabilities and underweighting (resp. overweighting) of high probabilities.[28]

$$\pi(p) = \frac{p^\gamma}{[p^\gamma + (1-p)^\gamma]^{1/\gamma}} \tag{6}$$

It follows that for subject i and a given lottery $k \in \{L, R\}$, the prospective

[28] We use a Tversky and Kahneman (1992) specification. Another specification could be a Prelec specification, as used by Tanaka et al. (2010). The value of the risk preferences in the gain and loss domains is very close under these two specifications. The results are available from the authors upon request.

utility is written as shown in eq. 7.

$$PU_i^k = \pi\left(p_j^k\right).v_i(y_h^k) + \pi\left(1 - p_j^k\right).v_i(y_l^k) \tag{7}$$

Here, we consider a stochastic model in which the subjects make errors in comparing the expected utility of the lotteries.[29] In the Fechner error model that we use here, subject i chooses lottery L if $d^* + \epsilon = PU_i^L - PU_i^R + \epsilon > 0$ and lottery R otherwise, where ϵ is a random component normally distributed with mean zero and variance σ^2. We estimate four parameters using maximum likelihood estimation: risk aversion in gains r, loss aversion λ, probability distortion γ and the standard deviation of the error component σ.

Results

The results are reported in Table 6. First, we observe that in all models, the estimated standard deviation σ is highly significant, indicating that the subjects made mistakes in evaluating the prospective utility of the lotteries. Column 1 of Table 6 reports the average estimated risk preference parameters. We test whether these parameters are statistically equal to one, especially for γ and λ, because expected utility theory assumes $\gamma = 1$ and $\lambda = 1$. We find that all three risk parameters are significantly different from one ($Prob < 0.001$), indicating that CPT is a fairly good description of our sample risk preference. We find that the value function is concave in the gain domain ($r < 1$), indicating that, on average, the subjects exhibited risk aversion in gains. Regarding losses, an estimated parameter $\lambda > 1$ indicates that losses were overvalued relative to gains of the same size, i.e., the subjects were loss averse. Finally, the subjects overweighted low probabilities and underweighted high probabilities, because $\gamma < 1$.

[29] As noted by Loomis (2011), stochastic models are partly a response to the experimental evidence of random variations in the subjects' choices. Several models may be used; however, comparing their performance is beyond the scope of this study.

Table 6: Maximum likelihood estimation of risk and loss attitudes

	(1)	(2)
Risk aversion parameter r		
Constant	0.523***	0.821***
	(0.041)	(0.119)
Female		-0.101**
		(0.050)
Age		-0.007***
		(0.002)
Income[a]		-0.009
		(0.053)
Education[a]		0.117**
		(0.051)
Loss aversion parameter λ		
Constant	1.652***	2.694***
	(0.174)	(0.701)
Female		0.138
		(0.317)
Age		-0.020
		(0.015)
Income[a]		-0.401
		(0.316)
Education[a]		-0.130
		(0.344)
Probability distortion parameter γ		
Constant	0.684***	0.831***
	(0.037)	(0.110)
Female		-0.103*
		(0.055)
Age		-0.001
		(0.003)
Income[a]		-0.133**
		(0.056)
Education[a]		0.033
		(0.057)
Standard deviation σ	0.735***	0.646***
	(0.122)	(0.102)
Goodness of fit		
Number of obs.	5,670	5,670
Log likelihood	-3,459.0364	-3,337.6318
Prob >0	0.000	0.000

Notes: We consider a normally distributed Fechner error term with mean zero and variance σ^2. [a] Income is a dummy variable equal to 1 if the reported income is greater than or equal to € 3,099; education is a dummy variable equal to 1 if the reported educational level is greater than or equal to a master's degree; and ***; and **; and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Standard errors are in parentheses, clustered at the individual level.

Our results can be compared with those found in the literature. A general result in the literature is the heterogeneity of preferences, as discussed in Von Gaudecker

et al. (2011). Most articles estimating CPT risk preferences use standard subject pools (students), as does the seminal article by Tversky and Kahneman (1992). Our sample is more risk averse (0.52 instead of 0.88), is less loss averse (1.65 instead of 2.25) and similarly distorts probabilities (0.68 instead of 0.61-0.69). Another example is Harrison and Rutström (2009), who find lower levels of risk aversion (0.71-0.72), loss aversion (1.38) and probability distortion (0.91). Few articles use non-standard subjects from developed countries in a CPT framework. Von Gaudecker et al. (2011) elicit two risk preference parameters in a large sample in Denmark. Our findings are in line with theirs. Depending on the treatment, they find that risk aversion varies from 0.3 to 1 and loss aversion varies from 0.7 to 1.8.[30]

In column 2 of Table 6, we introduce sociodemographic characteristics. Only the parameter for loss aversion remains statistically significantly different from one ($Prob = 0.0157$). We observe several statistically significant parameters associated with the sociodemographic variables. Similar to Von Gaudecker et al. (2011), we find that risk aversion was higher for women and older individuals but lower for more educated individuals. However, for our sample, risk aversion did not differ depending on the subjects' income. It is interesting to relate this result to that of Von Gaudecker et al. (2011), who find that risk aversion is not significantly associated with wealth (assets, housing property, etc.). Note that in a recent meta-analysis of gender differences in risk aversion, Filippin and Crosetto (2016) show that in multiple price list settings such as ours, gender differences in risk aversion are not the rule and that they are triggered by features of the experimental design, such as the presence of a safe option and fixed probabilities.

Regarding loss aversion, sensitivity to losses does not differ depending on

[30] See, in the Appendix of Von Gaudecker et al. (2011), model (12), in which γ in their model is equivalent to $1 - r$ in our model, and Tables A.33 and A.34.

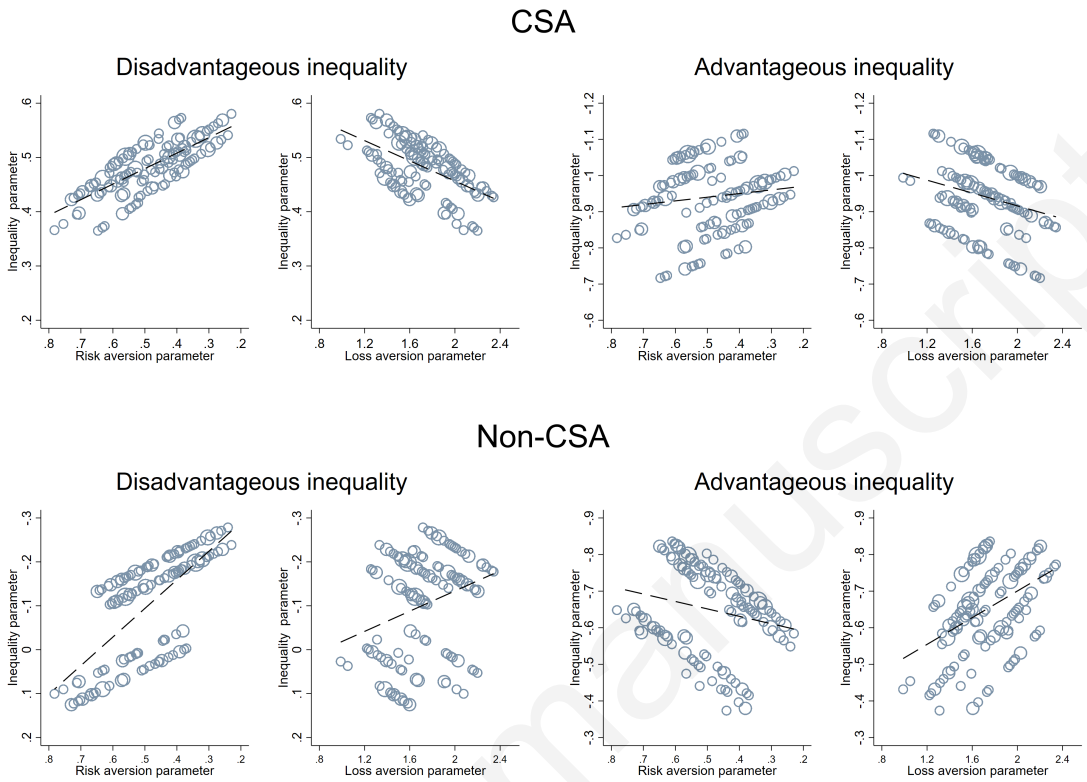
the subjects' characteristics, a result partly in line with those of Von Gaudecker et al. (2011), who find that middle-income and older subjects are less loss averse. Finally, probability distortion, not estimated in Von Gaudecker et al. (2011), is found to increase for women and high-income individuals.

3.4. Results for the relationship between inequality aversion and risk preferences

Finally, an interesting question that is rarely investigated in the literature relates to the potential relationship between inequality aversion and risk preferences. To that end, we perform an exploratory study with the individual parameters for inequality aversion and risk preferences derived from the estimations conducted with the sociodemographic characteristics of subjects (see Tables 5 and 6).[31] For inequality aversion preferences, we focus on our unconstrained model, which has the advantage of distinguishing advantageous from disadvantageous inequality. Fig.3 depicts this relationship broken down by the identity of the other recipient in the distribution experiment.

[31] Note that the individual parameters have to be regarded as a proxy for individual preferences because we used few sociodemographic characteristics, with two of them as dummy variables, to derive them.

Figure 3: Relationship between inequality aversion and risk preferences



Note: Risk neutrality refers to a risk aversion parameter equal to 1. Consequently, the x-axis for the risk aversion parameter is reversed such that moving to the right, i.e., low risk aversion parameter values, means an increase in risk aversion. The y-axis for the inequality parameter in the case of negative values is also reversed such that moving to the top, i.e., low inequality parameter values, means an increase in inequality aversion.

We first observe a clear difference in these relationships depending on whether inequality preferences refer to the CSA (i.e., the top panel of Fig.3) or the non-CSA farmer (i.e., the bottom panel of Fig.3).

Second, focusing on the CSA farmers, note that the individual parameters for disadvantageous inequality are all positive, meaning that all subjects exhibit disadvantageous inequality seeking behavior, while the individual parameters for advantageous inequality are all negative, reflecting aversion to advantageous inequality. These two parameters, with their respective signs, suggest that consumers care about CSA farmers faring as well as them. We observe that the more subjects care about inequality (high disadvantageous and low advantageous in-

equality parameters), the more risk averse they are. This observation is especially pronounced when considering disadvantageous inequality, for which the positive relationship is highly statistically significant.[32] Moreover, highly disadvantageous inequality seeking subjects are, on average, more risk averse than low disadvantageous inequality seeking subjects.[33] Turning to advantageous inequality, even if the overall relationship is not statistically significant, on average, strongly inequality-averse subjects are slightly more risk averse ($p = 0.0697$). Regarding loss aversion, the opposite relationships are found: the more subjects care about inequality, the less they are averse to losses. Once again, this result is less pronounced when we consider advantageous inequality.

Here, considering CSA farmers, subjects who are highly concerned with inequality are highly risk averse in the gain domain but less loss averse. In the context of CSAs, subjects are mainly confronted with possible losses. Our results suggest that subjects who strongly care about inequality with CSAs are less averse to losses so that inequality and risk preferences in the loss domain might complement to strengthen their support for CSA farmers.

Turning to non-CSA farmers, our findings are starkly different from those obtained when we consider CSA farmers. However, they are close to those previously observed in the thin literature examining the relationship between inequality aversion and risk preferences with standard subject pools. Note that in our study, the individual disadvantageous inequality parameters are either negative, demonstrating aversion toward inequality, or positive, demonstrating some inequality seeking. We observe a positive relationship between disadvantageous inequality aversion and risk aversion, which means that highly inequality-averse

[32] In this subsection, unless otherwise specified, all correlation tests refer to the Spearman rank correlation coefficient, which is significant at the 1% level.

[33] In this subsection, comparisons are performed using the Mann-Whitney U test, and groups are formed from the median value; all results are significant at the 1% level unless otherwise specified.

subjects are, on average, significantly more risk averse than their counterparts. This result is in line with those found in the study of Carlsson et al. (2005), where respondents made pairwise choices between hypothetical lotteries or societies characterized by different levels of inequality aversion. In that study, the authors find a positive relationship between risk aversion and inequality aversion. Turning to advantageous inequality, as in the laboratory experiment of Muller and Rau (2016), we find a highly significant negative correlation between risk aversion and subjects' aversion to advantageous inequality.

Finally, to the best of our knowledge, no study to date has explored loss aversion. We observe here that subjects who are highly averse to inequality – whether disadvantageous or advantageous inequality – are also highly averse to losses. This finding may suggest that those who are the more sensitive to a deviation from a reference point as equality are also those who are the more averse to losses. This last result can be seen as initial evidence on the relationship between aversion toward advantageous inequality and loss aversion since, to our knowledge, no other study has explored this issue.

4. Discussion and concluding remarks

Risk-sharing is a distinct feature of community-supported agriculture. Using field experiments, previous studies find that consumers are averse to inequality towards farmers. For community-supported agriculture, while stated preference surveys and share price analysis indicate that CSA consumers care for the CSA farmer and are averse to risk, no study to date has elicited CSA consumers' inequality and risk preferences using economic experiments. We aim to elicit these preferences by focusing on one type of other-regarding preference, namely, inequality aversion, and considering risk preferences in the gain and loss domain. To this end, we design two incentivized field experiments for a sample of 162 French CSA shareholders.

We find evidence of inequality aversion. Specifically, by distinguishing disadvantageous from advantageous inequality, an important result seldom reported in the experimental economics literature is that our sample is disadvantageous inequality seeking toward CSA farmers. In line with the results of the experimental economics literature, we find aversion to disadvantageous inequality toward non-CSA farmers and aversion to advantageous inequality toward both CSA and non-CSA farmers. Considering a cumulative prospect theory framework, we find that CSA consumers are not only risk averse but also loss averse and that they tend to distort probabilities. These preferences are similar to what has been elicited from samples of the general population. Finally, we examine the relationship between inequality aversion preferences and risk preferences. An especially interesting result is that subjects who strongly care about inequality toward CSAs are less averse to losses.

Our results have several implications. First, our findings on inequality aversion demonstrate that the value that consumers derive from CSA participation is not due only to intrinsic properties of food products such as product quality and freshness. CSA consumers care about inequality toward CSA farmers. Second, we find evidence of risk aversion, which might be an impediment to the retention of CSA consumers. We also find evidence of loss aversion, which indicates that losses loom larger than gains. Even if CSAs recognize that low crop output can occur, CSAs implicitly assume symmetry between what is lost and what is gained, claiming that too little produce at a given time is compensated for later by more produce. Our results show that consumers treat gains and losses differently. We also show that subjects distort probabilities and consider losses more likely than they truly are, which strengthens the impact of potential losses. CSAs contracts have been found incomplete; how uncertainties will be dealt with is not mentioned in the contracts consumers sign. Because of loss aversion, CSAs will probably gain from more explicitly communicating about how low crop out-

put will be dealt with. However, our results on correlations also suggest that inequality and risk preferences in the loss domain might complement each other to strengthen consumers' support for CSA farmers. Finally, even if our subject pool consists of CSA consumers, we find inequality aversion not only toward CSA farmers but also, to a lesser extent, toward non-CSA farmers. This shows an interest not only in CSA supply channel but more broadly in local food supply, in line with the growing demand for locally-produced food observed in many countries.

Our study has some limitations. First, we consider only CSA consumers. An interesting avenue for future research would be to examine whether consumers who intend to become CSA members express the same preferences. Second, we examine the relationship between inequality aversion and risk preferences by means of correlation analysis. An interesting follow-up study would be to compare the relative impact of inequality aversion and risk preferences on CSA participation. Such a study would require a unique utility model that includes both risk and inequality aversion preferences, which constitutes a challenging methodological issue, especially since these two types of preferences can interplay (see, for example, Cappelen et al., 2013).

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754 **Appendix - Questionnaire**

755

You are going to take part in a survey. Our study focuses on the behavior of CSAs members when choosing between different types of contracts. You will participate in a survey to explore your preferences for these contracts. This survey is conducted jointly by INRA and the University of Rennes 1.

By taking part in this experiment, you commit yourself to not disclose to other CSAs members the content of this study. In the same way, your answers will remain confidential and will be treated anonymously. At the end of this study, you will receive a lump sum payment of 10 €, plus an additional payment that depends on your decisions. The amount of your earnings depends only on your decisions so that your final earnings can range from 7.90 € to 180 €. Thank you for participating in this study.

This personal payment will be sent at your home address within 10 days. You are free to dispose of it as you like afterwards.

The information collected is subject to an electronic data processing that aims to study consumer behavior towards CSAs. The data recipients are INRA and the University of Rennes 1. In accordance with the French law known as "Data-processing and Freedoms", of January 6th 1978 modified in 2004, you benefit from the right to access and require rectification of the personal information that has been collected about you. If you wish to enforce this right, please contact XXX. You can also, for legitimate reasons, oppose the processing of data.

This questionnaire is composed of five parts. In the first part, you will have to answer a series of questions about your consumption habits. In the second part, you will have to choose between different types of vegetables contracts according to your personal preferences. In the third part, you will be presented several situations in which you have to choose between two different lotteries. In the fourth part, you need to classify several allocations of 8 € between three different actors. Finally, in the fifth part, you will be asked to answer a few demographic questions.

1) What share of household food purchase do you personally make (check a single box)?

1. ❑ Most of them 2. ❑ About half 3. ❑ Less than half

2) What is your zipcode ? ……..

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3) When buying fresh vegetables, how important are the following criteria? Please tick one answer per row.

	Not interested	Few interested	Moderately interested	Interested	Very interested
3-1 Taste:	1	2	3	4	5
3-2 Appearance (color, comestic, texture):	1	2	3	4	5
3-3 Organic food:	1	2	3	4	5
3-4 Production location:	1	2	3	4	5
3-5 Selling location:	1	2	3	4	5
3-6 Environmental impact:	1	2	3	4	5
3-7 Price:	1	2	3	4	5

4) How often do you visit a grocery store for buying food products? Please indicate the number of times per week.

4-1 Large grocery stores (e.g., Supermarkets): …… | |

4-2 Mum & pop stores: …… | |

4-3 Organic food stores (e.g., Whole foods): …… | |

4-4 Specialized stores (e.g.: Butchers, Bakers): …… | |

4-5 Local markets: …… | |

4-6 Directly from farmers (e.g., farms, CSAs, etc.): …… | |

4-7 Other type of stores (Indicate what type): ……

5) Do you know the following farm products sales structures?

	I use them	I know them	I heard about them	I do not know them
5-1 Farmer markets: ……	1	2	3	4
5-2 Collective marketing stores: …	1	2	3	4

6) Do you feel concerned by the following activities / events?

	Not concerned	Few concerned	Moderately concerned	Concerned	Very concerned
6-1 Fresh produce consumption: …….	1	2	3	4	5
6-2 Cooking fresh produce: ……	1	2	3	4	5
6-3 Knowing the origin of products: ……	1	2	3	4	5
6-4 Respecting the environment: ……	1	2	3	4	5
6-5 Supporting local farmers (close to Rennes): …….	1	2	3	4	5
6-6 Learning more about agriculture: ……	1	2	3	4	5

7) The following questions aim to provide some indications about your current CSA contract:

7-a) What is the duration of your contract (in months)?

7-b) What is the basket size you contracted for?

7-c) What is the approximate weight of your vegetables basket?

7-d) What is the price of your vegetable basket?

7-e) How long have you been a CSA member?

7-f) Are there occasionally losses in vegetables baskets including the period from June to March?

Two tasks will now be exposed to you. This will help us to better understand how you make your decisions. At the end of this study, there will be a draw between these two tasks. From the selected task, one of the situations will be drawn and determine your payment. One of the two tasks will present more or less risky situations. The other task will present several situation of gain sharing.

You will participate in a game in which you will have to choose between two lotteries. Each of these lotteries involves two different gains (in euros) with an associated probability. We present you below 2 series with 14 situations and 1 series with 7 situations in which you have to choose between lottery A and lottery B.

If the present task is randomly selected at the end of the study, 1 out of the 35 situations (2 series with 14 situations and 1 series with 7 situations) will be randomly selected. Your earnings will be computed from the selected situation and the result of the lottery you have selected (lottery A or lottery B).

For each of the 14 situations in series 1:
- Lottery A proposes a gain of 4€ with a probability 0.3 (3 chances over 10) and a gain of 1€ with a probability 0.7 (7 chances over 10).
- Lottery B proposes a gain of 0.5€ with a probability 0.9 (9 chances over 10) and a higher gain that varies depending on the situation with a probability 0.1 (1 chances over 10).

For each of the 14 situations in series 2:
- Lottery A proposes a gain of 4€ with a probability 0.9 (9 chances over 10) and a gain of 3€ with a probability 0.1 (1 chances over 10).
- Lottery B proposes a gain of 0.5€ with a probability 0.3 (3 chances over 10) and a higher gain that varies depending on the situation with a probability 0.7 (7 chances over 10).

Please indicate, for each situation in series 1 and 2 if you prefer lottery A or lottery B.

[The interviewer also explains aloud how lotteries work and answer consumers' questions to avoid any misunderstanding]

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Series 1	Lottery A		I prefer playing the lottery …	Lottery B		Situation ↓
Probabilities:	0.3	0.7		0.1	0.9	
Gains : (in euros)	4€	1€	0.❑ A ou B ❑.1	6.8€	0.5€	1 (13-1)
	4€	1€	0.❑ A ou B ❑.1	7.5€	0.5€	2 (13-2)
	4€	1€	0.❑ A ou B ❑.1	8.3€	0.5€	3 (13-3)
	4€	1€	0.❑ A ou B ❑.1	9.3€	0.5€	4 (13-4)
	4€	1€	0.❑ A ou B ❑.1	10.6€	0.5€	5 (13-5)
	4€	1€	0.❑ A ou B ❑.1	12.5€	0.5€	6 (13-6)
	4€	1€	0.❑ A ou B ❑.1	15€	0.5€	7 (13-7)
	4€	1€	0.❑ A ou B ❑.1	18.5€	0.5€	8 (13-8)
	4€	1€	0.❑ A ou B ❑.1	22€	0.5€	9 (13-9)
	4€	1€	0.❑ A ou B ❑.1	30€	0.5€	10 (13-10)
	4€	1€	0.❑ A ou B ❑.1	40€	0.5€	11 (13-11)
	4€	1€	0.❑ A ou B ❑.1	60€	0.5€	12 (13-12)
	4€	1€	0.❑ A ou B ❑.1	100€	0.5€	13 (13-13)
	4€	1€	0.❑ A ou B ❑.1	170€	0.5€	14 (13-14)

Series2	Lottery A		I prefer playing the lottery …	Lottery B		Situation ↓
Probabilities:	0.9	0.1		0.7	0.3	
Gains : (in euros)	4€	3€	0.❑ A ou B ❑.1	5.4€	0.5€	15 (13-15)
	4€	3€	0.❑ A ou B ❑.1	5.6€	0.5€	16 (13-16)
	4€	3€	0.❑ A ou B ❑.1	5.8€	0.5€	17 (13-17)
	4€	3€	0.❑ A ou B ❑.1	6€	0.5€	18 (13-18)
	4€	3€	0.❑ A ou B ❑.1	6.2€	0.5€	19 (13-19)
	4€	3€	0.❑ A ou B ❑.1	6.5€	0.5€	20 (13-20)
	4€	3€	0.❑ A ou B ❑.1	6.8€	0.5€	21 (13-21)
	4€	3€	0.❑ A ou B ❑.1	7.2€	0.5€	22 (13-22)
	4€	3€	0.❑ A ou B ❑.1	7.7€	0.5€	23 (13-23)
	4€	3€	0.❑ A ou B ❑.1	8.3€	0.5€	24 (13-24)
	4€	3€	0.❑ A ou B ❑.1	9€	0.5€	25 (13-25)
	4€	3€	0.❑ A ou B ❑.1	10€	0.5€	26 (13-26)
	4€	3€	0.❑ A ou B ❑.1	11€	0.5€	27 (13-27)
	4€	3€	0.❑ A ou B ❑.1	13€	0.5€	28 (13-28)

Now assume that you still take part in a game in which you have the choice between lottery A and lottery B. This time each of these two lotteries offer a gain and a loss (in euros) associated to the same given probabilities. We present below a series with 7 situations in which you have to choose between lottery A and lottery B.

For each of the 7 situations in series 3:
- Lottery A proposes a loss of 0.4€ or a loss of 0.8€ with a probability 0.5 (5 chances over 10) each and a gain that varies depending on the situation with a probability 0.5 (5 chances over 10).
- Lottery B proposes a gain of 3€ with a probability 0.5 (5 chances over 10) and a loss that varies depending on the situation with a probability 0.5 (5 chances over 10).

Please indicate, for each situation if you prefer lottery A or lottery B.

Series 3	**Lottery A**		**I prefer playing lottery …**	**Lottery B**		
Probabilities :	**0.5**	**0.5**		**0.5**	**0.5**	**Situation ↓**
Gains or losses: (in euros)	2.5€	-0.4€	0.❑ A ou B ❑.1	3€	-2.1€	(29) (13-29)
	0.4€	-0.4€	0.❑ A ou B ❑.1	3€	-2.1€	(30) (13-30)
	0.1€	-0.4€	0.❑ A ou B ❑.1	3€	-2.1€	(31) (13-31)
	0.1€	-0.4€	0.❑ A ou B ❑.1	3€	-1.6€	(32) (13-32)
	0.1€	-0.8€	0.❑ A ou B ❑.1	3€	-1.6€	(33) (13-33)
	0.1€	-0.8€	0.❑ A ou B ❑.1	3€	-1.4€	(34) (13-34)
	0.1€	-0.8€	0.❑ A ou B ❑.1	3€	-1.1€	(35) (13-35)

In the next task, you will be asked to rank 13 possible distributions of money among three people, depending on your preferences. You should rank the 13 possible distributions from 1 (the best) to 13 (the worst). The three people involved in this experiment are:

- **YOU**: which indicates the amount in euros that is allocated to you.

- **FARMER IN CSA**: which indicates the amount in euros that is allocated to a CSA farmer in the surrounding cities of Rennes. This CSA farmer supplies only CSA (he sells his products only to CSA consumers) and he practices organic farming.

- **FARMER NOT IN CSA**: which indicates the amount in euros that is allocated to a non CSA farmer in the surrounding cities of Rennes and he practices organic farming.

If this task is selected at the end of the study, 2 out of the 13 possible distributions will be randomly selected and you will earn the amount allocated to you in the best ranked option among the 2 selected. Further, a CSA farmer will be randomly selected among CSA farmers in the surrounding area of Rennes and he will be given the amount allocated to the CSA farmer in the selected option. In the same way, a non CSA farmer will be randomly selected among non CSA farmers in the surrounding cities of Rennes and he will earn the amount allocated to the non CSA farmer in the selected option.

[The interviewer also explain aloud how this task works and answer consumers' question to avoid any misunderstanding]

	Different types of distribution of 8 euros for …			
Situation	**You**	**Farmer in CSA**	**Farmer not in CSA**	**Your ranking (1 = the best, 13 = the worst)**
1 (14-1)	4	2	2	
2 (14-2)	0	4	4	
3 (14-3)	2	2	4	
4 (14-4)	3	4	1	
5 (14-5)	2	4	2	
6 (14-6)	4	0	4	
7 (14-7)	3	1	4	
8 (14-8)	2	3	3	
9 (14-9)	4	3	1	
10 (14-10)	1	4	3	
11 (14-11)	3	3	2	
12 (14-12)	4	1	3	
13 (14-13)	4	4	0	

15) How old are you ? ……

16) What is your highest education level?

- ☐ 1. Baccalauréat + 5 years
- ☐ 2. Baccalauréat + 4 years
- ☐ 3. Baccalauréat + 3 years
- ☐ 4. Baccalauréat + 1 or 2 years
- ☐ 5. Baccalauréat
- ☐ 6. BEP, CAP
- ☐ 7. Secondary (high) school
- ☐ 8. Primary school

17) What is the size of your household (included you)? ……

18) What is your actual occupation?

- ☐ 1. Farmer
- ☐ 2. Handcraft, Trade manager, Chief-executive
- ☐ 3. Executive, High intellectual occupation
- ☐ 4. Employee
- ☐ 5. Retired
- ☐ 6. Students
- ☐ 7. Unemployed

19) Monthly household income (before taxes):

- ☐ 1. Less than € 1,100
- ☐ 2. Between € 1,100 and € 1,899
- ☐ 3. Between € 1,900 and € 2,299
- ☐ 4. Between € 2,300 and € 3,099
- ☐ 5. Between €3,100 and € 3,999
- ☐ 6. Between € 4,000 and € 6,499
- ☐ 7. Greater than € 6,500

20) Are you a member of an environmental organization (other than CSA) ? ……

For the enumerator:

21) Gender : 0. ❑ Man ou 1. ❑ Woman

Enumerator's ID :

Location of the survey : **Date** :